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The genus *Gertrudiella* Broth. (Pottiaceae, Bryophyta) in Paraguay

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Abstract: As part of a study of the bryophytes of South America, some samples collected in Paraguay were identified as *Gertrudiella uncinicoma*, a species of Pottiaceae characterized by the presence of a well-developed central strand and a thick-walled hyalodermis on the stem, lanceolate leaves, laminal cells ventrally mammillose, and several rows of guides cells at the transverse section of the costae. This work represents the first record of the genus from Paraguay. A complete description, ecological comments, illustrations in optical and scanning electron microscopy, and a distribution map are presented.

Key words: *Barbula uncinicoma*; Boquerón; *Gertrudiella validinervis*; hyalodermis

In the course of a study of the bryological flora of Paraguay (Flores et al. 2015), some samples were found to perfectly match the description of *Gertrudiella uncinicoma* (Müll. Hal.) G.M.Suárez & Schiavone (Suárez & Schiavone 2010). This genus and species were not recorded previously from the country (O'Shea & Price 2008).

This species was first described by Müller (1879) as *Barbula uncinicoma* Müll.Hal. from samples collected in Córdoba, central Argentina. Later, this taxon was transferred to *Gertrudiella* (Suárez & Schiavone 2010), a unispecific genus described by Brotherus (1925) to accommodate a single species (*G. validinervis*) from Bolivia.

The aim of this work is to report for the first time the presence of this genus and species in Paraguay. A complete description, ecological comments, photomicrographs, and a distribution map are presented.

We studied samples collected in Paraguay and other specimens deposited in Instituto de Botánica del Nordeste (CTES), University of Helsinki (H), Friedrich-Schiller-Universität Jena (JE), Naturalis (L), and Fundación Miguel Lillo (LIL). The specimens were analyzed morphologically using conventional techniques for bryophytes and mounted in Hoyer's solution (Anderson 1954).

Microscopic characters were analyzed by using light microscopy (LM) with a Leica Model CME, and scanning electron microscopy (SEM) with JEOL 5800 LV operating at 20 KV. The SEM images were obtained from samples mounted on double-sided tape and coated with gold-palladium.

Examined material. Paraguay. Boquerón, Distrito Mariscal Estigarribia, Estancia Tapir, en el suelo, 20/VII/2014, *Sánchez 072* (CTES, LIL). Punto Yacaré, en el suelo, 25/VII/2014, *Sánchez 080* (CTES, LIL).

Additional samples examined. Argentina. Salta, Alemania, km. 83, Arroyo Ayuza, Guayacan, 20/IX/1985, *Schiavone 1431* (LIL). Santiago del Estero, Parque Nacional Copo, 25°55′18″ S, 061°42′45″ W, 158 m, very abundant forming dense grass on clayey and dry soil, surrounded by *Selaginella sellowii* Hieron., 01/III/2011, *Jimenez & Niveiro 109* (CTES, LIL). Córdoba, Huerta Grande, roadside slope, 07/IX/2009, *Suárez 742 &749* (LIL).

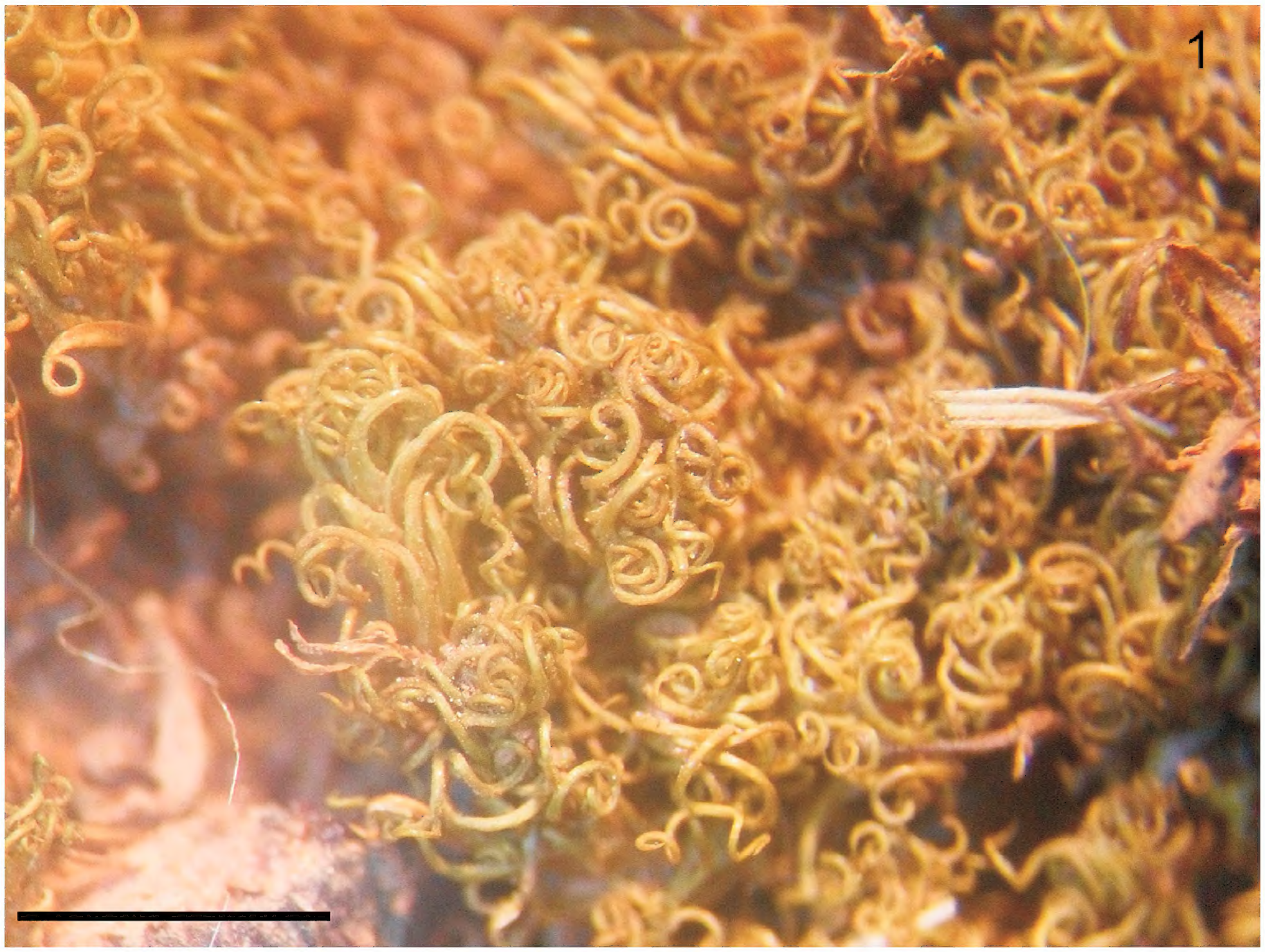
Gertrudiella uncinicoma (Müll. Hal.) G.M.Suárez & Schiavone. (Müller 1879: 345; Suárez & Schiavone 2010: 679). Type: Argentinia Cordobensis, in der Barrancas von Cordoba, Nov. 1870, *Lorentz*. Lectotype: (NY); Isotype: (H!). Figures 1–10

= *Gertrudia validinervis* Herzog. First synonymized by Suárez & Schiavone (2010)

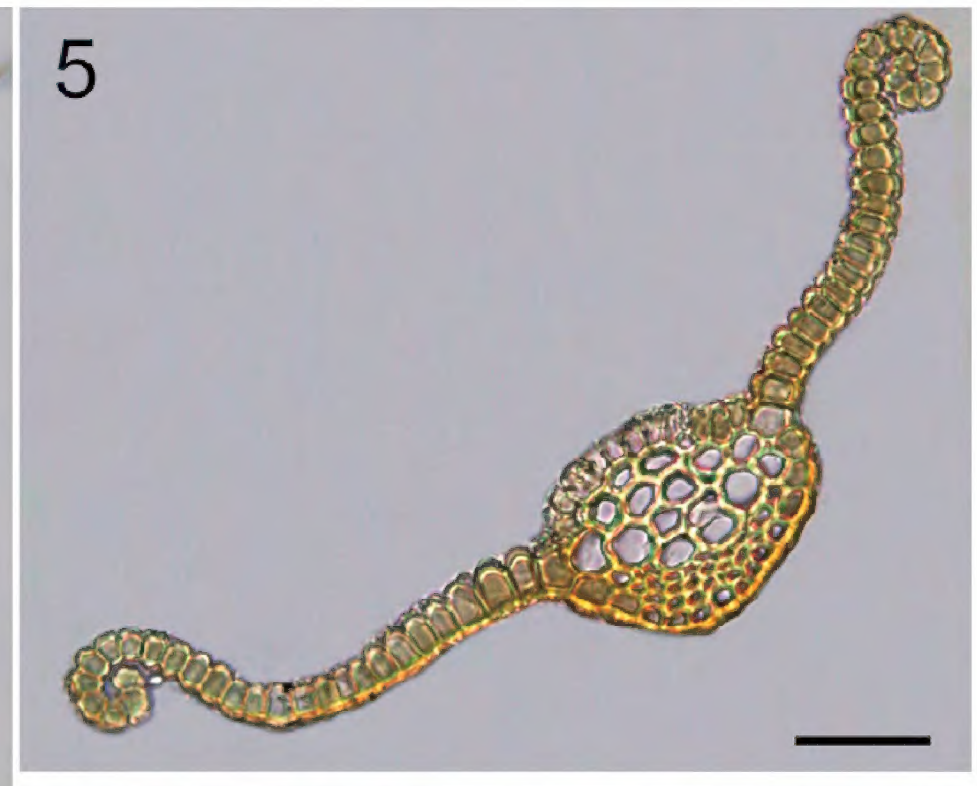
≡ *Getrudiella validinervis* (Herzog) Broth. (Herzog 1916: 44; Brotherus 1925: 528).

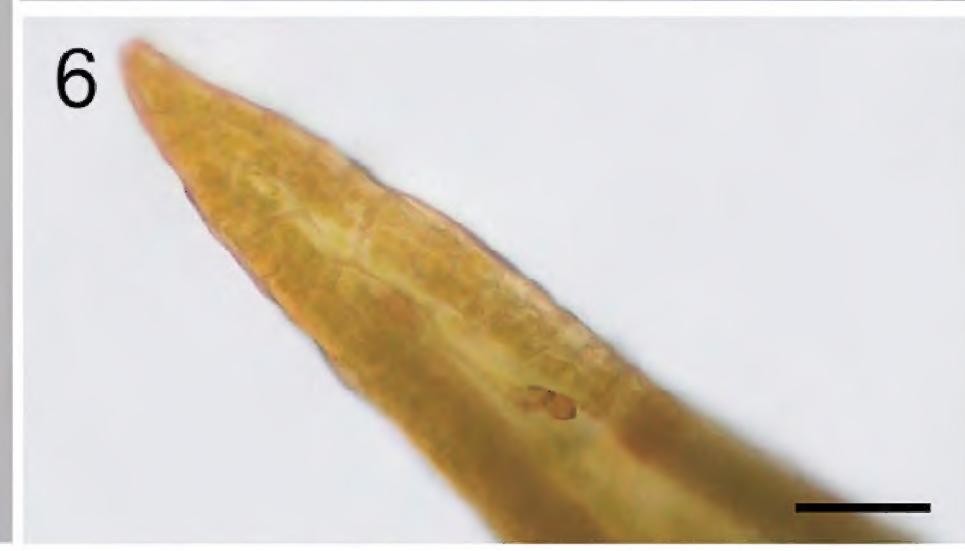
Type. Bolivia, in der Donbuschsteppe de Palo, ca. 1600 m., *Herzog 4344*. Lectotype: (JE!); isotype: (L!)

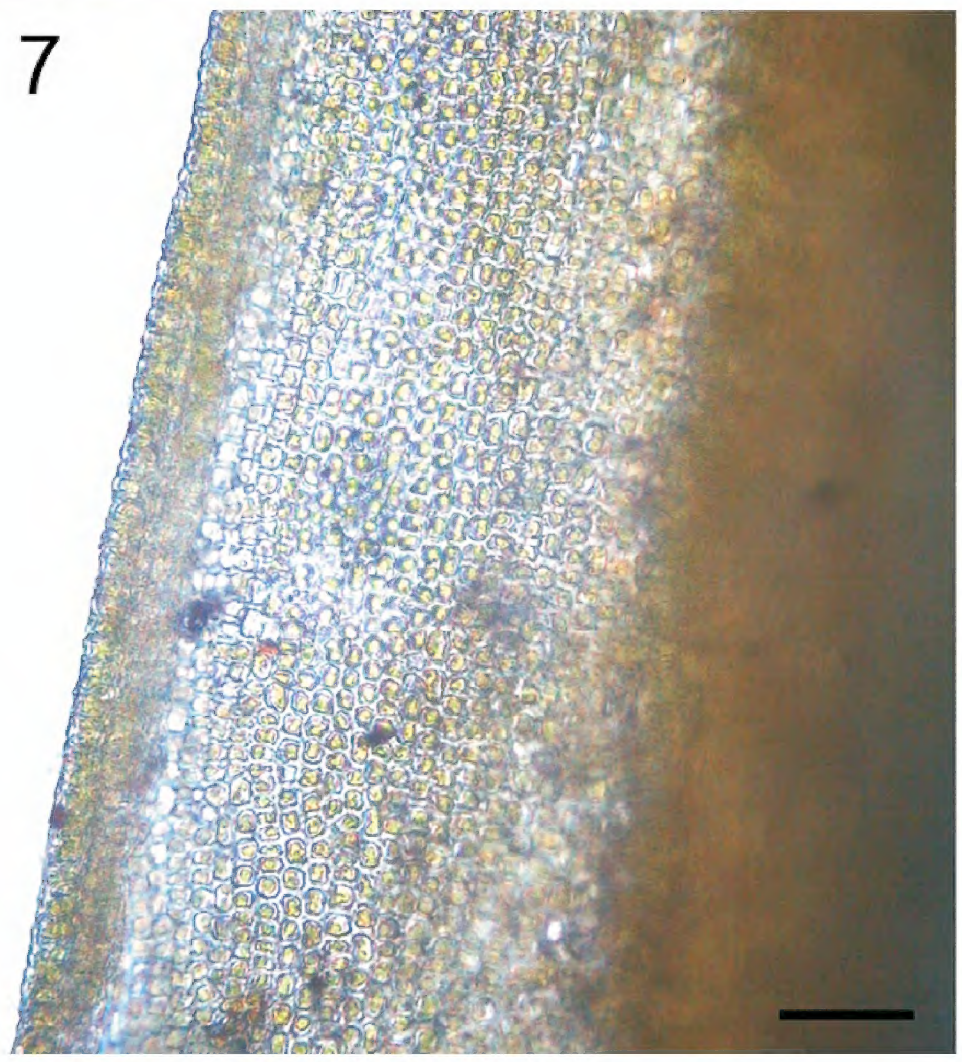
Plants forming dense cushions, yellowish-green, turning brownish below. **Stems** erect, simple or irregularly branching, 1.0–2.0 cm in length, transverse section rounded to pentagonal, central strand well developed, sclerodermis present, hyalodermis with thick-walled cells; axillary hairs 7–10-celled, apical cell hyaline and elongate. **Leaves** crowded, strongly contorted when dry, squarrose from a sheathing base when moist, lanceolate, 3.4–4.5 × 0.4–0.6 mm, upper lamina broadly channeled across leaf; margins strongly revolute to near apex, entire; apex acuminate to acute; base long-elliptical; costae usually percurrent to

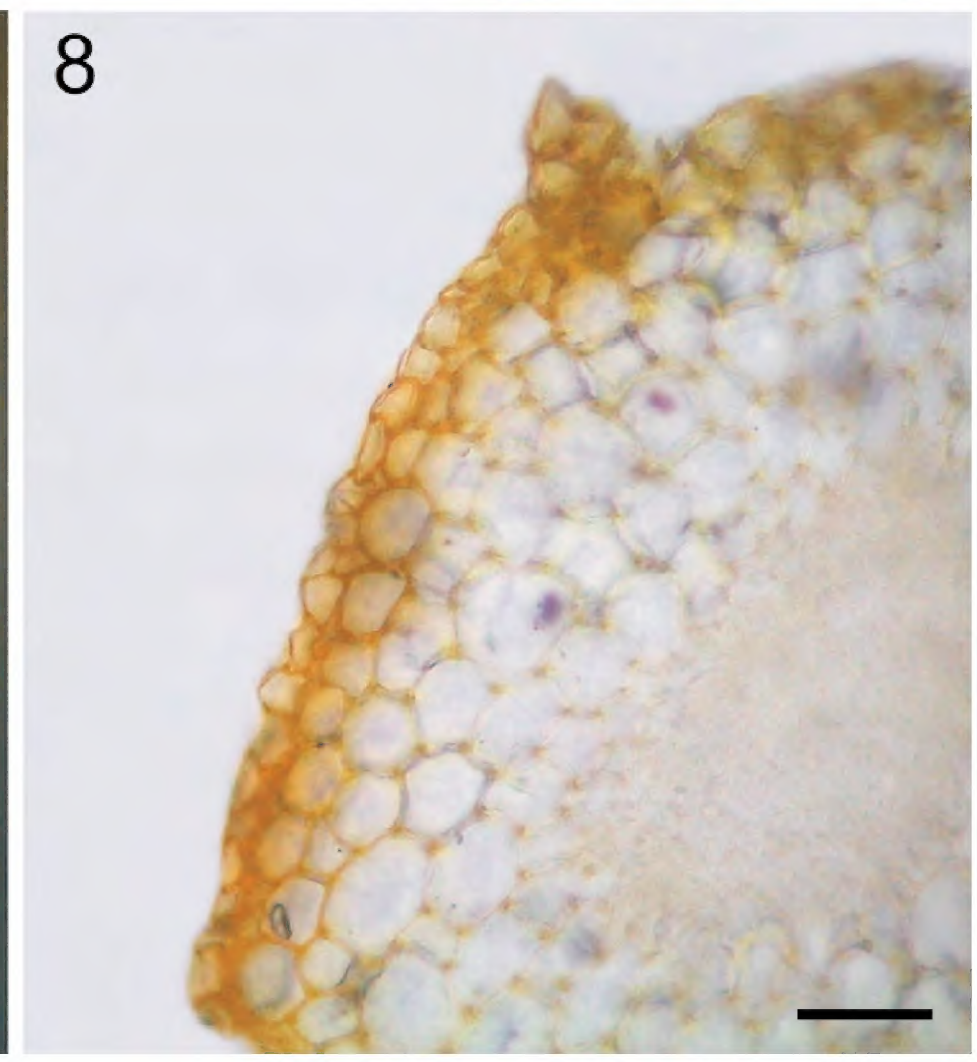


Figures 1–3. *Gertrudiella uncinicoma* (Sánchez 072, CTES, LIL). **1.** Cushions, scale bar = 1 cm. **2.** Dry plant, scale bar = 0.5 cm. **3.** Wet plant, scale bar = 0.5 cm.



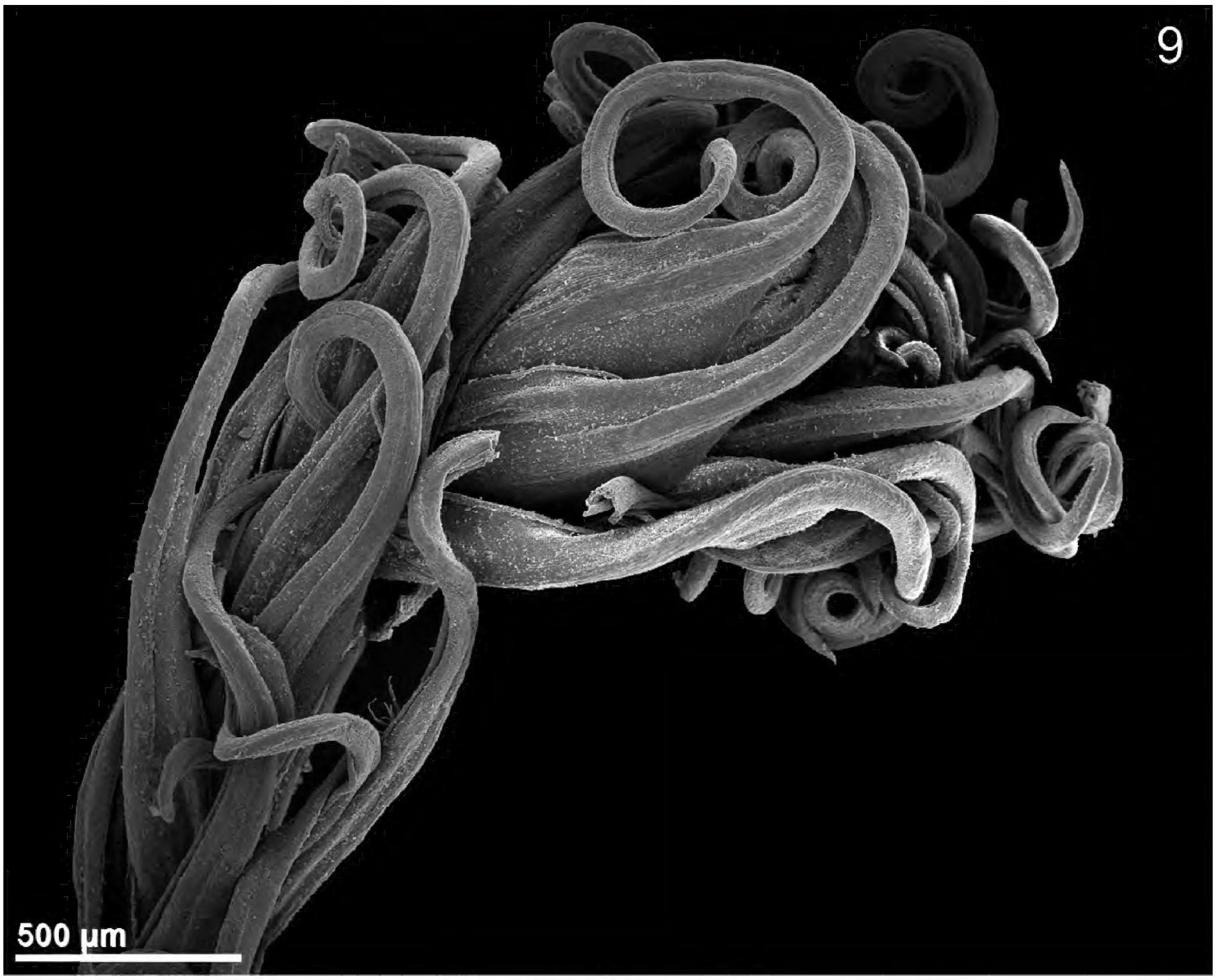


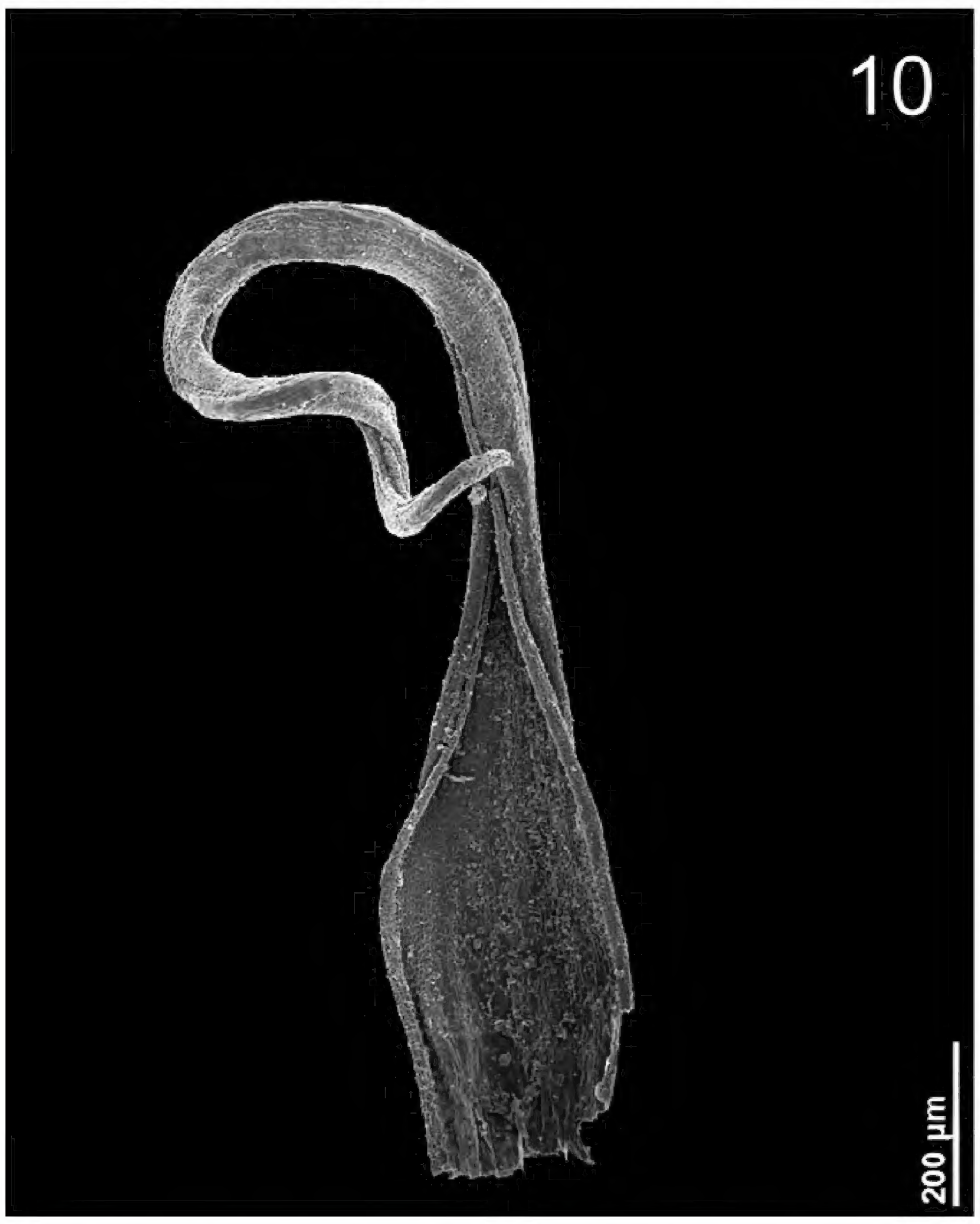




Figures 4–8. *Gertrudiella uncinicoma* (Sánchez 072, CTES, LIL). **4.** Vegetative leaf, scale bar = 0.5 mm. **5.** Transverse section of the leaf, scale bar = 50 µm. **6.** Apex of the vegetative leaf, scale bar: = 50 µm. **7.** Laminal cells at the middle of the lamina, scale bar = 50 µm. **8.** Transversal section of the stem, scale bar = 50 µm.

short-excurrent in an awn, costal transverse section semi-circular, stereid band single, strong and reniform, ventral epidermis present, dorsal absent, guide cells 15–20 in 3 or 4 layers, hydroid strand well developed; upper laminal cells subquadrate to isodiametric, small, 6.5–9.5 × 6.6–9.5 µm, superficially bulging-mammillose ventrally, flat dorsally; basal cells rectangular, 24–34 × 4–13 µm. **Dioicous**. **Perichaetia** terminal, gemmiform, perichaetial leaves lanceolate, 3.9–4.9 × 0.6–0.8 mm, apex acuminate. **Perigonia** terminal, gemmiform, paraphyses filiform, inner leaves deltoid, outer leaves elongate. **Setae** 11–12 mm in length, reddish brown, twisted clockwise below. **Capsule** 2.6–2.7





Figures 9–11. SEM micrographs of *Gertrudiella uncinicoma* (Sánchez 072, CTES, LIL). **9. 8.** Detailed of a vegetative branch on SEM. **10.** Adaxial surface of vegetative leaf (Sánchez 072, CTES, LIL). **11.** Abaxial surface of vegetative leaf on SEM (Sánchez 072, CTES, LIL).

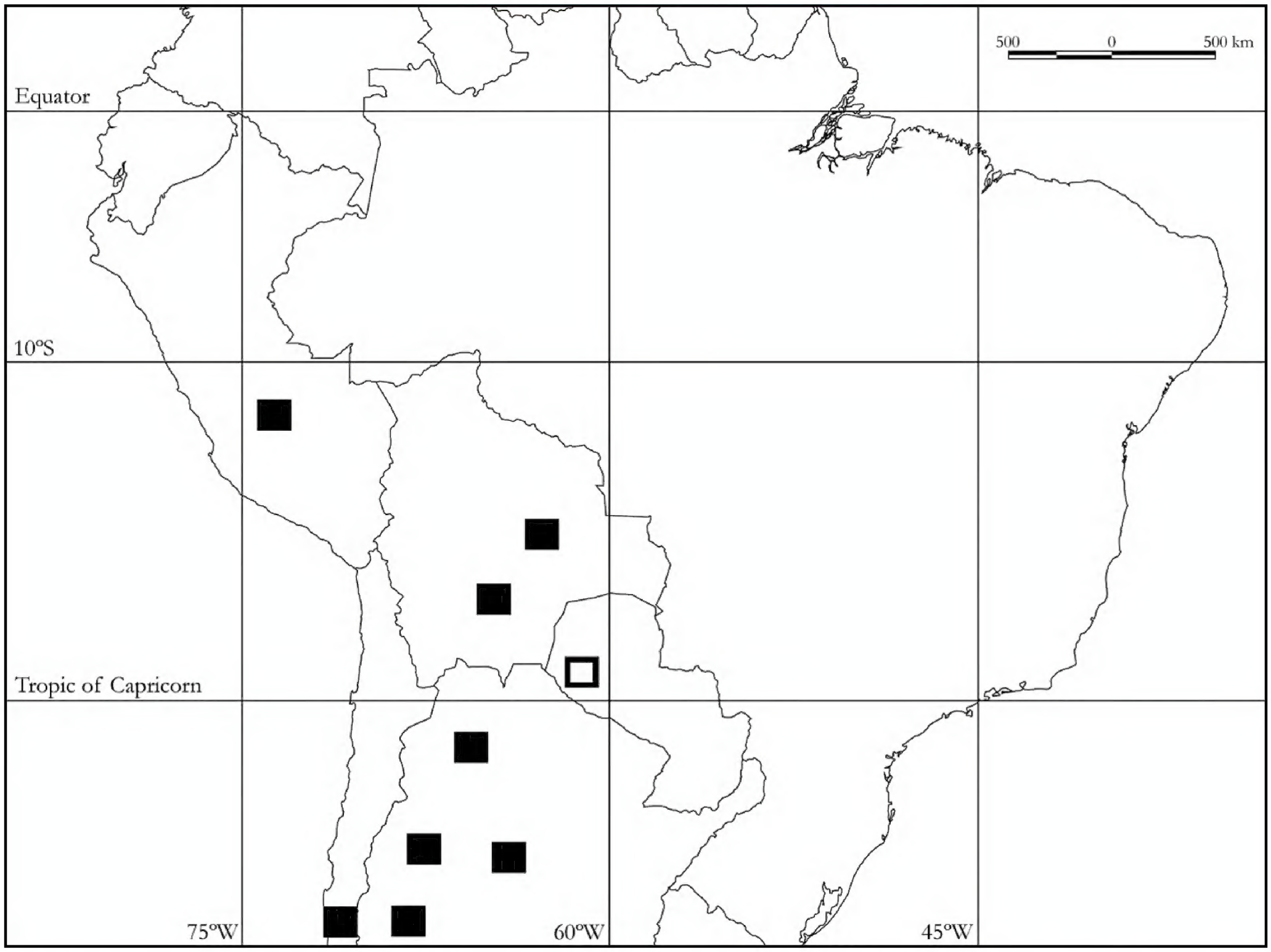


Figure 12. Distribution map of *Gertrudiella uncinicoma* in southern South America. Previous records are marked with filled squares, and the new record with an unfilled square.

× 0.5–0.7 mm, reddish-brown, cylindrical, exothecial cells 58–81 × 21–24 µm, oblong-rectangular to rectangular, thin-walled, annulus of 1 row of cells, brief. **Peristome** teeth 32, yellowish brown, filiform, twisted counterclockwise, densely spiculose. **Operculum** conic. **Calyptra** cucullate. **Spores** 8.3–9.9 µm in diameter, yellowish brown, weakly papillose to smooth. Laminal KOH color reaction yellowish-orange.

Habitat and geographical distribution. *Gertrudiella uncinicoma* is commonly found forming dense cushion on soil, sometimes associated with extensive mats of *Selaginella* sp. and in disturbed areas. It is a Neotropical species (Figure 12), known to date from Argentina, Bolivia, Chile and Peru. This work represents the first record of the genus from Paraguay, extending the distribution area of the species and adding information about the bryological diversity of the country.

For further synonyms, descriptions and illustrations, see Schiavone & Suárez (2003), Suárez & Schiavone (2010), and Zander (1993).

As a result of recent collecting expeditions to Paraguay, some specimens collected exhibit in all diagnostic characters of *Gertrudiella uncinicoma*. These results allow us to confirm for the first time the presence of the genus in the country. *Gertrudiella uncinicoma* is characterized by the presence of a strong central strand on the stem, a well-developed hyalodermis composed of thick-walled cells, acute leaves with a sheathing base, laminal cells mammillose on the ventral surface, plane to the dorsal, and more than 6 guide cells distributed in 3 or 4 rows in transverse section of the costae. This first record of the genus in Paraguay increases the range of distribution, and proves that it is wider than previously supposed.

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